

*Low Control Software Project Management Plan -Example - 1b  
Version 2.1*

## Software Project Management Plan

**Contract number: NAS1-12345**  
**Contractor: Software Systems, Inc. (SSI)**  
**89213 Research Dr.**  
**Hampton VA, 23633**

<b>Software Project Title:</b> Phased Microphone Array Control System (PMACS)	
<b>File Name and Version:</b> PMACS-SPMP-ver1-rev0.doc <b>Date of Issue:</b> April 23, 1999	<b>Software Class:</b> Low Control
<b>Schedule Start Date:</b> April 19, 1999	<b>Schedule End Date:</b> Mar. 21, 2000
<b>SSI Manager (Primary Point of Contact), CM Manager, Tester</b>	Ms Sharon Stone Software Systems, Inc. Ph: 865-1234 Fax: 865-2435
<b>Requirements Analyst</b>	Mr. Don Johnson Software Systems, Inc. Ph: 865-4321 Fax: 865-2435
<b>Software Manager</b>	Mrs. Julie Andrews ABC Competency, XYZ Branch Ph: 864-1010 Fax: 864-1011 (Approved SPMP May 6, 1999)
<b>Requester</b>	Phillip Morris M&M Competency, ABC Branch Ph: 864-5555 Fax: 864-5551 (Approved SPMP May 6, 1999)

### 1. Requirements

SSI will fulfill all the requirements and adhere to all constraints specified in the Software Acquisition Plan (PMACS-SAP-ver1-rev0.doc). To further refine the requirements, a Software Requirements Description (SRD) will be developed by SSI. Input from the users will be needed during the development of the SRD and technical interchange meetings will be set up with the requester and users to solicit their input. In addition, SSI will prototype and demonstrate a GUI to the requester to solicit feedback before delivery of the SRD.

### 2. Life Cycle and Approach

The life cycle chosen for this development is a tailored version of option "D" as defined in Guidance on LMS Software Procedures (URL: <http://sw-eng.larc.nasa.gov/process/>). The life cycle phases are as follows: Software Project Startup (including Requester Requirements Analysis), Software Requirements Phase, Coding and Testing Phase, Software Qualification Testing Phase, Acceptance Support Phase, and Maintenance Phase. A simple waterfall development approach (one pass through the defined phases) will be used during the development.

### 3. Deliverables

SSI will provide the deliverables specified in the Software Acquisition Plan on the dates specified in the enclosed schedule.

### 4. Trade Study and Purchases

The trade study was documented in the Software Acquisition Plan. No other study is deemed necessary. No purchases are required.

## **5. Reviews, Verification, and Validation**

### **5.1 Joint Reviews**

Joint Reviews will be conducted with the Software Manager as specified in the Software Acquisition Plan according to the enclosed schedule.

### **5.2 Verification**

#### **5.2.1 Documentation**

Prior to draft and final delivery, all documents will be reviewed internally by someone other than the author to ensure that they are correct, complete, clear, and in conformance with the requirements and constraints specified in the Software Acquisition Plan.

#### **5.2.2 Software Requirements**

A trace matrix in the SRD will show traceability to the requirements specified in the Software Acquisition Plan. Before delivery of the SRD, SSI will verify it to ensure that all requirements specified in the Software Acquisition Plan are included or referenced and to ensure that all requirements in the SRD are complete, clear, consistent, feasible, and testable. Software Manager approval of the SRD (via e-mail) will be required before the Coding and Testing Phase can start.

#### **5.2.3 Unit and Integration Testing**

Unit and Integration Testing will be performed on all software before the start of the Software Qualification Testing Phase to ensure that the software items perform correctly according to their requirements. Records of these tests will be posted in the PMACS Test Logs on the XYZ Branch Server under the directory C:\Projects\Morris\PMACS\Deliverables\TestLog. In addition, SSI will spot check the software itself to ensure that it contains internal documentation as to its form and function.

### **5.3 Validation**

The Software Qualification Test Procedures will be performed at SSI's site at the time specified in the schedule below. SSI will correct and re-test all problems encountered during testing before the beginning of the Acceptance Support Phase.

## **6. Development Schedule**

The following "Rough-Order-of-Magnitude" (ROM) schedule is provided for the PMACS software development. This ROM schedule is based on the limited knowledge SSI has of the detailed requirements of the project. After the Software Requirements Description has been completed, SSI will submit a revised SPMP schedule to the requester if changes are necessary.

Attachment 2 contains a copy of Document 193 received in the Software Acquisition Plan, augmented with the required data. It will be resubmitted (via e-mail) whenever changes occur.

Attachment 3 contains the additional metrics data (to date) required in the Software Acquisition Plan. SSI will update and resubmit Attachment 3 at project completion and again six months after project completion.

SSI will deliver Monthly Status Reports (as specified in the Software Acquisition Plan) within three working days of the end of each month.

*Note: It is recommended that the following table be rolled out as a separate document so that revisions to the SPMP are not required when the schedule changes.*

<b>Activity</b>	<b>Duration</b>	<b>Start</b>	<b>End</b>
<b>Project Start to End</b>	<b>232 days</b>	<b>4/19/99</b>	<b>3/21/00</b>
<b>1. Software Project Startup</b>	<b>14 days</b>	<b>4/19/99</b>	<b>5/6/99</b>
Proposed SPMP – Analysis/Development	5 days	4/19/99	4/23/99
Proposed SPMP – Draft Delivery	0 days	4/23/99	4/23/99
Individual Review – Proposed SPMP	4 days	4/26/99	4/29/99
Joint Review – Proposed SPMP	1 day	4/30/99	4/30/99
Proposed SPMP – Deliver/Baseline	4 days	5/3/99	5/6/99
<b>2. Software Requirements Analysis Phase</b>	<b>14 days</b>	<b>5/7/99</b>	<b>5/26/99</b>
SRD – Analysis/Development	4 days	5/7/99	5/12/99
SRD – Draft Delivery	0 days	5/12/99	5/12/99
Revised SPMP – Analysis/Changes	2 days	5/13/99	5/14/99
Revised SPMP – Draft Delivery	0 days	5/14/99	5/14/99
Individual Review – SRD & Revised SPMP	5 days	5/17/99	5/21/99
Joint Review – SRD & Revised SPMP	1 day	5/24/99	5/24/99
SRD & Revised SPMP – Deliver/Baseline	2 days	5/25/99	5/26/99
<b>3. Coding &amp; Testing Phase</b>	<b>61 days</b>	<b>5/13/99</b>	<b>8/9/99</b>
Help File – Analysis/Development	3 days	5/27/99	6/31/99
Help File – Draft Delivery	0 day	6/31/99	6/31/99
Individual Review – Help File	*2 days	6/1/99	6/2/99
Joint Review – Help File	1 day	6/3/99	6/3/99
Help File – Delivery/Baseline	1 days	6/4/99	6/4/99
Code – Development/Unit Testing	44 days	5/13/99	7/15/99
Code – Integration Testing	10 days	7/16/99	7/29/99
Qualification Test Procedures – Analysis/Development	5 days	7/16/99	7/22/99
Qualification Test Procedures – Draft Delivery	0 days	7/29/99	7/29/99
Individual Review – Qualification Test Procedures	5 days	7/30/99	8/5/99
Joint Review – Qualification Test Procedures	1 day	8/6/99	8/6/99
Qualification Test Procedures – Delivery/Baseline	1 day	8/9/99	8/9/99
<b>4. Software Qualification Testing Phase</b>	<b>18 days</b>	<b>8/10/99</b>	<b>9/2/99</b>
Software Qualification Testing & Rework	10 days	8/10/99	8/23/99
Software Qualification Test Results Report	1 day	8/24/99	8/24/99
Software Configuration Index Record (SCIR)	2 days	8/25/99	8/26/99
Software Qualification Test Results Report and SCIR – Draft Delivery	0 days	8/26/99	8/26/99
Individual Review – Software Qualification Test Results Report and SCIR	4 days	8/27/99	8/31/99
Joint Review – Software Qualification Test Results Report and SCIR	1 day	9/1/99	9/1/99
Software Qualification Test Results Report and SCIR – Delivery/Baseline	0 days	9/2/99	9/2/99
Final Product Installation/Baseline	1 day	9/2/99	9/2/99
<b>5. Acceptance Support Phase</b>	<b>9 days</b>	<b>9/3/99</b>	<b>9/16/99</b>
Acceptance Testing, Rework, & Re-baseline	8 days	9/3/99	9/15/99
Acceptance Test Results Report – Delivery/Baseline	1 day	9/16/99	9/16/99
<b>6. Maintenance Phase</b>	<b>126 days</b>	<b>9/17/99</b>	<b>3/21/00</b>
Corrections	126 days	9/17/99	3/21/00
Enhancements	126 days	9/17/99	3/21/00

\*A short review period is scheduled for this deliverable item so that user feedback can be input into coding activities at the earliest possible date.

The Configuration Control Board will be scheduled to meet whenever change requests or trouble reports are received.

## **7. Acceptance Criteria and Procedure**

SSI will perform the Software Qualification Test Procedures at the XYZ Branch site at the time specified in the schedule above and in accordance with the 'Acceptance Criteria and Procedure' specified in the Software Acquisition Plan. By performing the Software Qualification Test Procedures and performing system checks after test execution, SSI will validate that the software performs the functions claimed on the platform for which it was designed without harm to the system or the data contained in the system.

## **8. Risk Management**

The Risk Spreadsheet (Attachment 1) shows the risk data as of the date of this plan issue. SSI will perform the risk management practices specified in the Software Acquisition Plan on a continuous basis.

## **9. Installation and Operations**

N/A

## **10. Maintenance**

SSI will perform the maintenance activities specified in the Software Acquisition Plan according to the schedule defined above. The Software Metrics Database trouble report and change request forms will be used to document and track all maintenance activities (i.e. identified problems or errors and requested minor enhancement changes). Classification information will be entered on the forms. Configuration Management of changes is covered in Section 11 below. Request prioritization, analysis, and approval are also covered in Section 11. The same implementation, verification, validation, and acceptance processes as defined above (i.e., in Sections 2, 5, and 7) will be used to implement all approved maintenance changes. Release and delivery will be performed as described in Section 11.

## **11. Configuration Management Plan**

This plan contains the software configuration management planning information required by LMS-CP-5528.

### **11.1 Software Configuration Manager (SCM)**

Sharon Stone will perform the roles and responsibilities of the SCM.

### **11.2 The Configuration Item List**

Attachment 4 contains the Configuration Item List.

### **11.3 Configuration identification**

SSI will apply a unique identifier to each Configuration Item (CI). The identifier will contain the following information:

{Project ID}-{Product ID}-ver{number}-rev{number}

where

{Project ID} = Abbreviated project title or RTA number or facility name,

{Product ID} = Abbreviated title of the product,

ver{number} = Version number, incremented by one each time the CI is baselined, and

rev{number} = Revision number, incremented by one for each change to the current version.

The unique identifier with the highest version number is the most recent baseline.

### **11.4 Keeping the Configuration Item List current**

The initial version of the Configuration Item List will be attached to the Proposed SPMP. Changes to the list will be made by the SCM and approved by the Software Manager before posting to the XYZ Branch Server under the C:\Projects\Morris\PMACS\Deliverables\Final\Documentation directory.

### **11.5 Baselining library location**

See Attachment 5 for the List of Electronic File Locations where baselines are stored.

### **11.6 Control of access to the baseline library and non-electronic items**

Access to the XYZ Branch Server is by user-id and password. SSI passwords will be removed after completion of the maintenance phase. Physical storage of non-electronic project materials will be located at SSI room 123, in the file drawer labeled "PMACS Storage." Access to non-electronic storage will be restricted to the SCM, who has a key to the file cabinet.

### **11.7 Retention period and disposal method**

SSI will turn over completed Formal Inspection records to the XYZ Branch Formal Inspection Archive Manager at the end of the Maintenance Phase. SSI will retain copies of PMACS deliverables for a two-month retention period after the scheduled end of the Maintenance Phase before disposal. At the end of the two-month retention period, all data will be disposed of. Electronic data will be deleted or thrown away. All paper records will be thrown away.

### **11.8 Back-up information**

- a. Restoration contact: Sharon Stone
- b. Frequency of backups: Backups will be performed daily (at 2:00 a.m. via an automated script file) of all project electronic files on the SSI/PMACS computer and the XYZ Branch Server, C:\Projects\Morris\PMACS directories.
- c. Backup files retention period: Backups will be maintained for two backup intervals.
- d. Backup storage: Backup files will be stored on a physically different computer host at LaRC Distributed Mass Storage System (DMSS).

### **11.9 Configuration Control Board (CCB)**

- a. Period of effectiveness: The CCB will operate until the end of the maintenance phase.
- b. Board Membership: The NASA Software Manager (Chair) and SSI SCM
- c. Scope of authority: All PMACS related baselines, change requests, and trouble reports
- d. Configuration management tools: The Software Metrics Database (available at <http://sw-eng.larc.nasa.gov/metrics/public/index.htm>) will be used to track configuration management related activities. It provides web accessible Software Trouble Reports, Software Change Requests, summary reports on their content, and Promotion Notifications. SSI will instantiate a copy of the database software on the XYZ Branch Server and will administer it for the life of this project. The Software Manager must furnish SSI with the names of all personnel who will be allowed to enter change and trouble reports, and SSI will issue them passwords to access the on-line forms. The on-line forms provide detailed instructions for implementing trouble reports and change requests. The Software Manager will play the role of "Software Engineering Manager" defined in the instructions.
- e. Operational procedures: Trouble reports and requested changes will be submitted to the Software Metrics Database via the Software Trouble Report Form and Software Change Request Form. Before implementation, the PMACS Configuration Control Board (CCB) will review for approval all trouble reports and change requests to baselined products and releases. If deemed appropriate, the NASA Software Manager will indicate (via the form) that SSI should analyze the request. The Software Manager is the approval authority for all trouble reports and change requests. The SCM will cooperate with the Software Manager in the convening of the CCB, in the approval, disapproval, or deferring of all requested product changes, and in defining acceptance criteria for approved changes. It is the responsibility of the SCM to assign SSI staff to implement change requests and to ensure that the test procedures are updated to verify that the changes have been implemented correctly. During the CCB meeting, the Software Manager will provide to SSI the priority order in which trouble reports and change requests should be addressed. The SCM will record all CCB meeting decisions and actions on the associated trouble report or change form, will e-mail the initiator about the decision made concerning the request, and, if the change is approved, will notify the requestor and all those affected once the change is complete.

### **11.10 Change status and trends**

The status of requested changes can be automatically generated by the CCB at any time by using the Software Metrics Database reports capability. Status will be tracked at CCB meetings. The SCM will perform analysis on trouble reports to detect adverse trends and eliminate their causes.

### **11.11 Baseline approval and storage**

The SCM is the approval authority for creating all baselines. SSI will baseline the software products in the Configuration Item List (see Attachment 4) after completing the applicable review, verification, and validation activities (as specified in Section 5) by moving them from the SSI/PMACS computer, C:\PMACS\Developmental directory, to the XYZ Branch Server (either the C:\Projects\Morris\PMACS\Deliverables\Draft directory for draft deliverables or the C:\Projects\Morris\PMACS\Deliverables\Final directory for final deliverables). Baselined files will have read and copy access only.

#### **11.12 Release of configuration items**

When a configuration item(s) is released (i.e., it is be moved to the baseline library), a new version of the Software Version Description will be created. The Software Version Description will contain the following:

- a. Project Title,
- b. Date of delivery,
- c. Issuing Organization,
- d. Inventory of all delivered items (i.e. unique CI identifier, description, date and time file last saved, and the location on the XYZ Branch Server),
- e. The name of the read-me file that includes instructions for CI use (i.e. instructions for building the executable object code, data for compiling and linking, the procedure used to recover software, and perform regression testing or modifications),
- f. All changes installed on this release,
- g. Identification of all known problems,
- h. The file name and location of the associated Software Requirements Description and Software Qualification Test Procedures.

#### **11.13 Ensure accuracy of the baseline library**

The SCM will review the files delivered to the XYZ Branch Server under the directory 'C:\Projects\Morris\PMACS\Deliverables' to verify that they match the latest version in the 'C:\PMACS\Development' directories before transmitting the e-mail notification of a baseline release to the Software Manager.

#### **11.14 Delivery**

SSI will review the Software Configuration Index Record to verify that it is correct and up to date before delivery. Delivery is performed by moving configuration items from the baseline directory to the XYZ Branch PMACS computer following the Acceptance Procedure and Criteria that are specified in the Software Acquisition Plan. The SCM will review the delivered computer files to verify that they are the latest version from the baseline library before conducting the Acceptance Procedure. A record of these the reviews is recorded in the Delivery Review Log.

#### **11.15 Labeling media**

It is not anticipated that removable media (e.g., disks or tapes) will be used. However, if the need should arise, the media label will contain the information required in LMS-CP-5529.

Barbara Streisand, April 23, 1999

**Contract Manager signature and date:** \_\_\_\_\_

Julie Andrews, May 1999

**Software Manager signature and date:** \_\_\_\_\_

#### **Attachment 1: Risk Spreadsheet**

*See the following URLs for the example Risk Spreadsheet.*

*Excel Version* - [http://sw-eng.larc.nasa.gov/process/forms/xlsdocs/risk\\_ex1.xls](http://sw-eng.larc.nasa.gov/process/forms/xlsdocs/risk_ex1.xls)

*Word Document Version* - [http://sw-eng.larc.nasa.gov/process/forms/wddocs/risk\\_ex1.doc](http://sw-eng.larc.nasa.gov/process/forms/wddocs/risk_ex1.doc)

*Adobe PDF File Version* - [http://sw-eng.larc.nasa.gov/process/forms/pdffdocs/risk\\_ex1.pdf](http://sw-eng.larc.nasa.gov/process/forms/pdffdocs/risk_ex1.pdf)

## DEVELOPMENT SCHEDULE FOR LOW, HIGH, AND CRITICAL CLASS SOFTWARE

PROJECT NAME	SOFTWARE CLASS	START DATE	END DATE	ASSIGNED EMPLOYEE OR CONTRACT COMPANY	SOFTWARE MANAGER (Indicate *)	ORG CODE	WORK PACKAGE OR WBS ELEMENT	FULL TIME EQUIVALENT (FTE)	Date SPMP Approved
PMACS	Low	4/19/99	3/21/00	SSI		NA	WHATSIT 8.0	1,748	5/6/99
PMACS	Low		9/15/99	Julie Andrews	*	NA	WHATSIT 8.0	15%	



### Attachment 3: Additional Metrics

Type of Metrics	Metrics Data
<p>Project Completion Metrics (to be provided at project completion, prior to the start of maintenance)</p>	<p><b><u>Required:</u></b>            Estimated Start Date = April 19, 1999            Estimated Completion Date = March, 21, 2000            Estimated Total Staff Hours =1,748            Estimated Total Cost = The estimated cost has been provided to the COTR on the Task Specification for this project.</p> <p>Actual Start Date =            Actual Completion Date =            Actual Total Staff Hours =            Actual Total Cost =</p> <p>Total Executable Source Lines of Code for Each Language Used</p> <p>COTS or GOTS Tool(s) Used and Comment on Satisfaction</p> <p>Platforms</p> <p><b><u>Optional:</u></b>            Methods Used and Comment on Satisfaction</p> <p>Lessons Learned and Feedback</p> <p>Best Practices</p>
<p>Maintenance Metrics (to be provided six months after project completion)</p>	<p>Number of approved problem reports implemented =            Hours spent performing the corrections =</p>

**Attachment 4: Configuration Item List**

<b>Description</b>	<b>Unique name</b>
Software Project Management Plan (proposed)	PMACS-PropSPMP
Software Project Management Plan (revised)	PMACS-RevSPMP
Software Requirements Description	PMACS-SRD
Configuration Item List	PMACS-CIL
Test Log	PMACS-TL{month-day-year}
Delivery Review Logs	PMACS-DRLog
Help File	PMACS-HF
Software Version Description	PMACS-SVD
Qualification Test Procedure	PMACS-QTPR
Qualification Test Results Report	PMACS-QTRR
Source Code	PMACS-SC
Object Code	PMACS-Obj
Executables	PMACS-Exe
Make File	PMACS-Make
Acceptance Test Results Report	PMACS-ATTR
Joint Review Minutes	PMACS-JRM-PropSPMP PMACS-JRM-SRD-RevSPMP PMACS-JRM-HF PMACS-JRM-QTPR PMACS-JRM-QTRR
Risk Spreadsheet	PMACS-RS-{month-day-year}
Formal Inspection Records	PMACS-FIR-{product ID}
Monthly Status Report	PMACS-MSR-{month-day-year}

## Attachment 5: List of Electronic File Locations

During development, computer files will be maintained according to the following directory structure.

File Type	Location Type	Location
Source code	Host and path	SSI/PMACS computer, C:\PMACS\Development\Source
Object code	Host and path	SSI/PMACS computer, C:\PMACS\Developmental\Object
Executables	Host and path	SSI/PMACS computer, C:\PMACS\Developmental\Executable
Documentation	Host and path	SSI/PMACS computer, C:\PMACS\Developmental\Documentation
Backups	Host and path	LaRC Distributed Mass Storage System (DMSS), /backup/PMACS/SSI/{date}/c.tar

Baselined draft and final deliverable files will be stored under the following directory structure, which constitutes the baseline library.

File Type	Location Type	Location
Source code	Host and path	XYZ Branch Server, C:\Projects\Morris\PMACS\Deliverables\Final\Source
Object code	Host and path	XYZ Branch Server, C:\Projects\Morris\PMACS\Deliverables\Final\Object
Executables	Host and path	XYZ Branch Server, C:\Projects\Morris\PMACS\Deliverables\Final\Executable
Documentation	Host and path	XYZ Branch Server, C:\Projects\Morris\PMACS\Deliverables\Draft\Documentation - and - C:\Projects\Morris\PMACS\Deliverables\Final\Documentation
Backups	Host and path	LaRC Distributed Mass Storage System (DMSS) \backup\PMACS\XYZ\{date}\c.tar
Archive	Host and path	LaRC Distributed Mass Storage System (DMSS) \archive\PMACS\XYZ\{date}\c.tar
Test Log	Host and path	XYZ Branch Server, C:\Projects\Morris\PMACS\Deliverables\TestLog.
Delivery Review Log	Host and path	XYZ Branch Server, C:\Projects\Morris\PMACS\Deliverables\Final\DeliveryLog
Monthly Status Minutes	Host and path	XYZ Branch Server, C:\Projects\Morris\PMACS\Deliverables\Final\MonthlyStatusMins
Review Minutes	Host and path	XYZ Branch Server, C:\Projects\Morris\PMACS\Deliverables\Final\ReviewMins